

Claims

1. Multitrack curve-tilting vehicle having at least three supporting elements (1a, 1b, 1c), more particularly wheels or runners or foils, for at least the purposes of transmitting a lateral guiding force between the vehicle and a ground (2), wherein

- at least two (1a, 1b) of the at least three supporting elements are laterally disposed on opposite sides of the vehicle's longitudinal axis (3) and
- at least one (1c) of the at least three supporting elements can be steered for directional control of the vehicle,

with

- means (4) for laterally tilting at least one section (5) of the vehicle about a tilting axis (6) running essentially parallel to the vehicle's longitudinal axis (3), so that while driving, more particularly in a bend or on sloping or uneven ground, the center of gravity of the vehicle can be displaced in a direction perpendicular to the direction (7) of travel, and
- at least one vehicle seat (8a, 8b, 8c) disposed on the tiltable section (5) of the vehicle, for a driver steering the vehicle,

characterized in that

- means (9a, 9b, 9c) of detection are provided for capturing a lateral sitting force exerted by the driver's body onto at least one vehicle-seat portion of the vehicle seat (8a, 8b, 8c) in a lateral direction (10a, 10b, 10c) perpendicular to the direction (7) of travel,
- the means (9a, 9b, 9c) of detection are in operative connection with the means (4) for lateral tilting, in such a way that
 - the lateral tilting occurs as a function of the detected lateral sitting force and
 - the tilting speed is a function, at least of the lateral sitting force and the speed of the vehicle, the tilting speed increasing with increasing lateral sitting force, with a factor that decreases with increasing vehicle speed.

2. Multitrack curve-tilting vehicle of claim 1,
characterized in that

- the supporting elements are formed as wheels (1a, 1b, 1c), and the vehicle is formed as a three-wheeled vehicle (30) with a curve-tiltable vehicle frame (5), wherein two (1a, 1b) of the three wheels are arranged side by side essentially symmetrically relative to the vehicle's longitudinal axis (3), and the third wheel (1c) is arranged essentially in the vehicle's longitudinal axis (3) but centrally offset, and
- the lateral tilting by the means (4) for lateral tilting occurs in such a way, and the vehicle is designed in such a way that the wheels (1a, 1b, 1c) assume an inclined position corresponding to the tilt, and the two wheels (1a, 1b) positioned side by side act like a fictitious single central wheel essentially in the vehicle's longitudinal axis (3).

3. Multitrack curve-tilting vehicle of claim 1 or claim 2,

characterized in that

- at least the vehicle-seat portion of the vehicle seat (8a, 8b, 8c) is mobile in a lateral direction (10a, 10b, 10c) perpendicular to the direction (7) of travel within the range (11a, 11b, 11c) of movement of the vehicle seat, and
- the means (9a, 9b, 9c) of detection are so designed that they capture quantitatively or qualitatively the lateral sitting force by a direct or indirect measurement of force or distance at least at the vehicle-seat portion of the vehicle seat (8a, 8b, 8c).

4. Multitrack curve-tilting vehicle of claim 3,

characterized in that

- the vehicle seat (8a) or the vehicle seat portion is mounted in such a way via a ball-and-socket joint with an axis of rotation (13) of the vehicle seat running essentially parallel to the vehicle's longitudinal axis (3) and centered relative to the vehicle seat that the vehicle seat (8a) is pivotable about the axis of rotation (13) of the vehicle seat into the lateral direction (10a) perpendicular to the direction (7) of travel within the range (11a) of movement of the vehicle seat.

5. Multitrack curve-tilting vehicle of claim 3,

characterized in that

- the vehicle seat (8b) has a backrest (14) with lateral bulges (15) for lateral support of the driver's torso and
- the lateral bulges (15) form the vehicle seat portion that is mobile in the lateral direction (10b) perpendicular to the direction (7) of travel within the range (11b) of movement of the vehicle seat.

6. Multitrack curve-tilting vehicle of claim 3,

characterized in that

- the vehicle seat (8c) comprises a seat squab (16) or is designed as a seat squab (16) and
- the seat squab (16) forms the vehicle seat portion that is mobile in the lateral direction (10c) perpendicular to the direction (7) of travel within the range (11c) of movement of the vehicle seat.

7. Multitrack curve-tilting vehicle of claim 4 or 5,

characterized in that

the operative connection between the means (9a, 9b) of detection and the means (4) for lateral tilting are formed in such a way that the lateral tilting occurs toward the side that corresponds to the direction of the lateral sitting force.

8. Multitrack curve-tilting vehicle of claim 6,

characterized in that

the operative connection between the means (9c) of detection and the means (4) for lateral tilting are formed in such a way that the lateral tilting occurs toward the side opposite to the direction of the lateral sitting force.

9. Multitrack curve-tilting vehicle of one of claims 3 to 8,

characterized in that

- elastic centering means (17) are provided which center at least the vehicle seat portion that is mobile in the lateral direction (10a, 10b, 10c) perpendicular to the direction (7) of travel within the range (11a, 11b, 11c) of movement of the ve-

hicle seat portion, through a restoring force to a central initial position, so that from the position of at least the vehicle-seat portion of the vehicle seat (8a, 8b, 8c) within the range (11a, 11b, 11c) of movement of the vehicle seat the lateral sitting force can be determined, and

- 5 • the means of detection are formed as at least one position detector (9a, 9b, 9c) capturing the position of at least the vehicle seat portion of the vehicle seat within the range of movement of the vehicle seat, so that the lateral sitting force can be captured.

10 10. Multitrack curve-tilting vehicle of claim 9,

characterized in that

the elastic centering means are formed as centering springs (17) having a variable initial spring bias that increases with increasing vehicle speed, and thus an increasing restoring force.

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11. Multitrack curve-tilting vehicle of one of claims 1 to 10,

characterized in that

- the means (4) for lateral tilting can be controlled hydraulically, and

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- the operative connection between the means (9a, 9b, 9c) of detection and the means (4) for lateral tilting are formed as a hydraulic connection and
- the means (9a, 9b, 9c) of detection are formed as hydraulic means of detection, and more particularly as a hydraulic valve, for instance a 4/3 directional control valve, through which the means (4) for lateral tilting can be controlled via the

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hydraulic connection.

12. Multitrack curve-tilting vehicle of one of claims 1 to 10,

characterized in that

- the means (4) for lateral tilting can be controlled electrically,

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and

- the operative connection between the means (9a, 9b, 9c) of detection and the means (4) for lateral tilting are formed as an electrical signal link and

- the means (9a, 9b, 9c) of detection are formed as electrical means of detection, and more particularly as a piezoelectric sensor, through which the means (4) for lateral tilting can be controlled via the electrical signal link.

5 13. Method for tilting a multitrack curve-tilting vehicle with

- means (4) for lateral tilting of at least one section (5) of the vehicle about a tilting axis (6) that runs essentially parallel to the vehicle's longitudinal axis (3), so that during travel, more particularly in a bend or on sloping or uneven ground, the vehicle's center of gravity can be shifted in a direction perpendicular to the direc-
10 tion (7) of travel,

- at least one vehicle seat (8a, 8b, 8c) disposed on the tiltable section (5) of the vehicle, for a driver steering the vehicle, and

- means (9a, 9b, 9c) of detection for capturing a lateral sitting force exerted by the driver's body onto at least one vehicle-seat portion of the vehicle seat (8a, 8b, 8c)
15 in a lateral direction (10a, 10b, 10c) perpendicular to the direction (7) of travel,

including the repeating steps of

- capturing the lateral sitting force with the means (9a, 9b, 9c) of detection,
- capturing the speed of the vehicle, and
- tilting at least the section (5) of the vehicle toward one side, wherein
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 - the side is determined by the direction of the lateral sitting force and
 - the tilting speed is a function, at least of the size of the captured lateral sitting force and the captured velocity, and the tilting speed increases with increasing lateral sitting force, with a factor that decreases with increasing vehicle speed.

25 14. Method of claim 13, wherein

the tilting occurs toward the side corresponding to the direction of the lateral sitting force.

15. Method of claim 13, wherein

30 the tilting occurs toward the side opposite to the direction of the lateral sitting force.